

CLAIMS

1. A trailer coupling apparatus comprising means to pivotably mount at least one left wheel and at least one right wheel to a trailer, independent means to pivotably connect the trailer to a towing vehicle and means to enable differential pivoting of the said wheels and trailer, with respect to the towing vehicle, as the towing vehicle is turned in use.
2. A trailer coupling apparatus as claimed in Claim 1 wherein the trailer comprises a trailer chassis to which is mounted a fixed set of wheels and wherein the trailer coupling apparatus comprises a set of wheels being pivotably mountable to the trailer.
3. A trailer coupling apparatus as claimed in Claim 2 wherein the pivotable wheels of the apparatus are connected to an axle which is mounted on a pivotable member.
4. A trailer coupling apparatus as claimed in Claim 1 or 2 wherein the pivotable wheels are connected to pivotable kingpins.
5. A trailer coupling apparatus as claimed in any preceding claim wherein the means to pivotably connect the trailer to a towing vehicle comprise a suspension means, and/or means to bias the connection means onto the towing vehicle in use.
6. A trailer coupling apparatus as claimed in any preceding claim wherein the means to pivotably connect the trailer to a towing vehicle comprises a tow bar.

7. A trailer coupling apparatus as claimed in Claim 6 wherein the tow bar comprises a female or male member at the distal end thereof, arranged in use to co-operate with the corresponding male or female member 5 on the towing vehicle.

8. A trailer coupling apparatus as claimed in Claim 6 or 7 wherein the tow bar comprises means to prevent the distal end of the tow bar from falling to ground level when it is not coupled to a towing vehicle.

10 9. A trailer coupling apparatus as claimed in any preceding claim wherein the pivotable wheels are arranged to pivot in the turning direction of the towing vehicle, in use.

15 10. A trailer coupling apparatus as claimed in any preceding claim wherein the means to effect differential pivoting of the pivotable wheels and the trailer comprise restriction means, arranged in use to delay or reduce the magnitude of pivoting of the wheels with respect of the trailer until the towing 20 vehicle has turned a prescribed angle.

11. A trailer coupling apparatus as claimed in Claim 10 wherein the restriction means effects restriction of pivoting of the pivotable wheels of the trailer to a fraction of the angle effected between the trailer and the towing vehicle chassis upon turning/pivoting of a 25 towing vehicle to which the trailer is connected, in use, until the towing vehicle has turned a prescribed angle.

12. A trailer coupling apparatus as claimed in Claim 10 and 11 wherein the restriction means enables movement 30

of the pivotable wheels of the trailer in the direction the towing vehicle turns, in use, and effects a restricted angle of turning of the pivotable wheels in relation to the turning arc of the towing vehicle.

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13. A trailer coupling apparatus as claimed in any one of Claims 10 to 12 wherein the restriction means comprises means to enable substantially optimal orientation of the pivotable wheels of the trailer, in relation to the orientation of the towing vehicle, in use, as the towing vehicle is turned.
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14. A trailer coupling apparatus as claimed in any one of Claims 10 to 13 wherein the restriction means effects restriction of pivoting of the wheels to an angle of no more than 85% of the angle turned by the towing vehicle.
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15. A trailer coupling apparatus as claimed in any one of Claims 10 to 14 wherein the restriction means comprises a steering member, moveably mountable on a channel member.
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16. A trailer coupling apparatus as claimed in Claim 15 wherein the channel member comprises an open end and a closed end.
17. A trailer coupling apparatus as claimed in Claim 16 wherein the open end is operably co-operable with the steering member to enable movement between the steering member and the channel member.
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18. A trailer coupling apparatus as claimed in Claim 16 or 17 wherein the closed end of the channel member is

arranged in use to restrict movement of the steering member to within the channel member.

19. A trailer coupling apparatus as claimed in any one of Claims 15 to- 18 wherein the steering member comprises 5 a steering bar.

20. A trailer coupling apparatus as claimed in Claim 19 wherein the steering bar comprises a protruding member at or near the distal end thereof, arranged to co-operate with the channel member of the restriction 10 means.

21. A trailer coupling apparatus as claimed in Claim 20 wherein the protruding member comprises a substantially spherical member and the channel member comprises a channel or substantially cylindrical 15 cross-section.

22. A trailer coupling apparatus as claimed in any one of Claims 15 to 21 wherein the steering member or channel member includes a plurality of gear teeth, arranged to co-operate with the corresponding plurality of teeth 20 on a turntable to which the pivotable wheels are connected.

23. A trailer coupling apparatus as claimed in any preceding claim wherein the restriction means comprises a plurality of pivotable arms, at least one 25 of said arms being connectable to the pivotable wheels and at least one of said arms being connectable to a towing vehicle in use, and wherein the maximum pivotable arc achievable by the pivotable wheels is restricted by the maximum pivot achieved by the 30 plurality of arms.

24. A trailer coupling apparatus as claimed in any preceding claim wherein the restriction means comprises a telescopic member.

25. A trailer coupling apparatus as claimed in any preceding claim wherein the apparatus comprises secondary restriction means, which in use, are connectable to the trailer and which restrict upward and downward movement of the pivotable wheels during turning of the trailer.

10 26. A trailer coupling apparatus as claimed in Claim 25 wherein the secondary restriction means comprise one or more buffers co-operable with each pivotable wheel and which are arranged to protrude towards the ground from the trailer adjacent to the trailer's front wheel 15 axle or axles.

27. A trailer comprising at least one pivotable front left and right wheel, and further comprising means to independently pivotably connect the trailer to a towing vehicle and means to enable differential pivoting of the trailer wheels and trailer, in relation to the towing vehicle, as the towing vehicle 20 is turned in use.

28. A trailer as claimed in Claim 26 wherein the pivotable wheels are mounted to a turntable located beneath the 25 trailer.

29. A trailer as claimed in Claim 26 or 27 wherein the means to independently pivotably connect the trailer to a towing vehicle and means to enable differential pivoting of the trailer wheels and trailer or as 30 described in any one of Claims 1 to 26.

30. A method of connecting a trailer to a towing vehicle, comprising the steps of:

- (a) connecting means to pivot at least one front left and right wheel to the trailer;
- 5 (b) connecting means to independently pivotably connect the trailer to a towing vehicle, to a trailer and towing vehicle; and
- (c) connecting means to effect differential pivoting of the trailer wheels and trailer to the trailer and towing vehicle.

10 31. A method as claimed in Claim 30 wherein steps (a), (b) and (c) are performed in any order.

15 32. A method as claimed in Claim 30 or 31 wherein the means to pivotably connect the wheels to the trailer, the means to pivotably connect the trailer to a towing vehicle and the means to differentially pivot the trailer wheels and trailer are as described in any one of Claims 1 to 29.